# Assessing Real Time Evaluation Practices in Different Learning Environments

**J. J. Fábregas**[*,1], **M. Ferruzca**[**,2] , **F. Grimón**[***,3], **J. M. Monguet**[****,1], **M. Sampieri**[*****,1]

[1] Universidad Politécnica de Cataluña, Av. Diagonal 647, EGE-Office, 08028 Barcelona, Spain
[2] Universidad Autónoma Metropolitana, Av. San Pablo 180, CYAD-Office, 02200 Mexico City.
[3] Universidad de Carbobo, Barbula, FACYT, Valencia, Venezuela.

This paper presents early assessment results of the Real Time Evaluation System (RTES) in several higher education settings using a blended learning methodology. The RTES allows a synchronous and customized supervision of the student's learning by carrying out real-time evaluations in different modalities. The Student can be physically present in the same classroom where the lecture is taking place, or follow the session and take part in the evaluation over the Internet. Real-time feedback regarding student's learning performance allows the professor to explain complicated or confusing contents more thoroughly. In addition, the student may contrast his understanding of the contents. The results from the implementation suggest that the system allows improving the learning process. Authors consider the use of RTES influences the learning process positively and increases the pedagogical value of evaluation. The software was created using the Feature-Driven Development methodology.

**Keywords** Evaluation; Blended Learning; Software; Synchronous; Feedback; JiTT

## 1. Introduction

*Blended learning* is a learning method that combines the *off-line* and *online* formats, where *online* means learning over the Internet and *off-line* represents the traditional classroom-based learning. Evaluation is a process that allows verifying the achievement of expected educational goals of a given course, contrasting student's performance and knowledge acquisition, and promoting feedback development among the participants of the process.

Learning requires fast and adequate feedback [1] that enables the student to reflect and clarify his understanding on an individual subject; learning becomes more effective when the student receives immediate feedback and not after several days or weeks. [2] As well as guiding education, feedback influences the student's motivation. [3]. *Just-in-Time Teaching (JITT)* is a strategy that promotes *feedback,* it combines two elements: traditional classroom-based activities and Web resources, producing an interaction cycle among them. Before the session, students are assigned several exercises that are submitted to the professor through the Web. The professor organizes and structures his class according to the students' knowledge of the subject. [1][4][5]. The current work used the JITT strategy as a reference to develop an *on-line* evaluation tool that supports real-time supervision and evaluation of student's performance. In addition, the tool allows observing how the students' learning is taking place.

This paper discusses the first findings noted by using RTES in different higher education settings using a blended learning methodology. The main objective of this exploratory research was to find out how the use of RTES impacts the teaching and learning process and examine its usefulness.

[*] Corresponding author: e-mail: juan.jose.fabregas@fundacion.upc.edu, Phone: +34 934016560
[**] Corresponding author: e-mail: mvfn@correo.azc.uam.mx, Phone: +52 5553189157
[***] Corresponding author: e-mail: fgrimon@uc.edu.ve, Phone: +58 241678243
[****] Corresponding author: e-mail: jm.monguet@upc.edu, Phone: +34 934016562
[*****] Corresponding author: e-mail: Monica.Sampieri@estudiant.upc.edu, Phone: +34 934016562

## 2. Methodology

### 2.1 Participants

The authors used the RTES with three groups of students from different education levels and educational modalities. Group A, was composed by 11 PhD students in virtual modality. In Group B, 9 PhD students participated in mixed modality, and 40 undergraduate students in face-to-face modality participated in Group C.

### 2.2 Description of the Experience

#### 2.2.1 Software Description

With de objective to evaluate in real time an *ad hoc* tool was created following the guidelines of the Feature-Driven Development methodology. The system has two user profiles: professor and student. Professor profile enables the user to create evaluations with multiple-choice questions. When conducting a session, the professor may access the evaluation question list, and then select from a list the question to be sent to the students. When the students answer the question and send it for revision, the professor visualizes three types of graphic interfaces:

- Interface 1. “All the questions”: indicates the number of correct and wrong answers for each question.
- Interface 2. “Current question”: displays the number of answers to each of a question’s choices, pointing out the correct answer.
- Interface 3. “Students”: displays the total number of correct answers for each student.

The “Student” profile allows the user to receive a question submitted by the professor, select one of the possible answers from a list, and then send it back for evaluation. The system evaluates the answer and automatically sends feedback to the student. In addition, the student can visualize two types of graphic interfaces: “All the questions” and “Students”.

#### 2.2.2. Exploratory Study

In the teaching and learning process evaluations can be carried out in different modalities depending on the time frame where they are applied. These modalities include:

- Pre Evaluation: the professor carries out an evaluation before explaining a topic (diagnosis test).
- Post Evaluation: the professor carries out an evaluation after the student has acquired some knowledge on a given subject.
- During Evaluation: the professor applies an evaluation as he explains the contents of the session.

RTES can be used with any of the previous evaluation modalities.

The utmost importance for developing and using RTES is the possibility for clarifying each of the questions individually. The question is submitted, the students answer it and send it back. Finally, the results are analyzed. Based on the results, the professor may emphasize on the aspects that were confusing or misunderstood and then explain why some options of the question were wrong before proceeding to the next topic, content or question.

In this study, a "Post Evaluation" was applied to Group A. Following this procedure: (1) the professor assigned an article for reading two weeks before the session, (2) the contents of the article was evaluated during the session, (3) the professor submitted a question to the students, (4) as soon as the students answer the question, feedback is provided to both the professor and the student, (5) the professor gets data on group performance and monitors who is taking part in the exercise.

Groups B and C were studied applying the "During Evaluation" approach. In this case, the professor divides his class material into different sections. Once he has finished explaining a section, then he submits one or several questions. Feedback is provided the same way as with group A.

In group A the professor-student communication takes place using a videoconference system, while the student-professor and the student-student communication are made possible using an on-line forum. In group C, the professor-student and student-student communication takes place face-to-face. In group B the communication is conducted through a mixture of the face-to-face and virtual modalities.

#### 2.2.3 Instruments for gathering data.

Three types of research instruments were used for gathering data: questionnaire, focus group and interview. The questionnaire and the focus group were used to collect data from students, while the interview technique was used with professors. Each instrument was applied to the students in the following manner:

- Group A: Focus Group technique. It consists of one virtual meeting organized to gather the students' opinion about the use and usefulness of the RTES. Data is obtained through a series of previously prepared questions and opinion comparison. When using this technique, the researcher must set up an activity agenda for the meeting.
- Group B and C: An on-line questionnaire using the same questions prepared for the Focus group meeting was applied.

The value scale used to evaluate the RTES and the dynamics of the session was: Excellent (7), Very Well (6), Well (5), Regular (4), Bad (3), Very Bad (2) and Terrible (1).

## 3. Results

Many students reported the intellectual effort needed to take a class using RTES is greater than taking a conventional face-to-face class, as Table 1 shows. In addition, they suggested that taking an RTES-aided class requires a higher intellectual effort because they have to concentrate and analyze to a higher extent during the session, and allows them to increase the quality of the learning process.

**Table 1**. Opinion of the intellectual effort invested by the students during a session using RTES.

| | | greater | minor | equal | No response |
|---|---|---|---|---|---|
| Intellectual effort | Group A *(n=11)* | 64% | 9% | 27% | |
| | Group B *(n=9)* | 78% | 11% | | 11% |
| | Group C *(n = 42)* | 43% | 14% | 43% | |

The students from the different groups valued the RTES positively as depicted in Table 2. Some students commented that the RTES is a good resource for supporting the learning process, because it is innovative, interactive and provides a high-level of feedback.

Regarding the dynamics of the session in Table 3, the participants valued it positively. According to the students, the RTES contributes to strengthening knowledge and promotes competitiveness. Additionally, students said they felt motivated using the tool because it improves the dynamics of the session.

As Table 4 shows, students said they learned easier and better using RTES because it allows them to solve immediately any doubts that may arise during the session. Also, a negative tendency was found regarding quantity of content learned during the session because several students said the dynamics of the session slows down and the questions are only focused in the study materials of the current session.

Finally, there is a positive attitude toward using RTES in future sessions, because it enables them to get immediate feedback and to improve the learning experience.

**Table 2**. Students' assessment of the RTES Tool.

| | | Excellent | Very Well | Well | Regular | Bad | Very Bad | Terrible |
|---|---|---|---|---|---|---|---|---|
| Assessment of RTES Tool | Group A *(n=11)* | 18% | 18% | 64% | 0 | 0 | 0 | 0 |
| | Group B *(n=9)* | 11% | 45% | 44% | 0 | 0 | 0 | 0 |
| | Group C *(n = 42)* | 5% | 43% | 43% | 7% | 2% | 0 | 0 |

Total (mean) = 5.39

**Table 3**. Students' assessment of the dynamics of the session.

| | | Excellent | Very Well | Well | Regular | Bad | Very Bad | Terrible |
|---|---|---|---|---|---|---|---|---|
| Assessment of the dynamics of the session | Grup A *(n=11)* | 9% | 0 | 82% | 9% | 0 | 0 | 0 |
| | Grup B *(n=9)* | 0 | 56% | 44% | 0 | 0 | 0 | 0 |
| | Grup C *(n =42)* | 5% | 38% | 38% | 14% | 5% | 0 | 0 |

Total (mean) = 5.26

**Table 4**. Considerations about the use of RTES and its usefulness for the learning process.

| | Group A *(n=11)* | Group B *(n=9)* | Group C *(n =42)* |
|---|---|---|---|
| The session is dynamic and participative | 73% | 78% | 90% |
| RTES is easy to use | 91% | 89% | 100% |
| With RTES is easy to learn | 64% | 67% | 69% |
| With RTES the learning is better | 73% | 56% | 69% |
| With RTES I learn more | 18% | 45% | 40% |
| I would like to use RTES again in the next sessions | 100% | 67% | 74% |

The professors suggested that one of the main benefits of RTES is its contributions increasing the class participation. On the other hand, they also think the tool is easy to use, though it can be improved if other functionalities are added. The professors comment that preparing a session using this system

represents a greater intellectual effort. They consider that students learn easier and better the contents of the course. Nevertheless, learning a greater amount of contents is related to the session's dynamics-design strategy. Finally, all the professors said they want to continue using the tool in the future.

## 4. Conclusions

The results obtained from the early study suggest implementing RTES can have a good effect on the learning process. Based on the facts, the professor can thoroughly explain complicated or confusing contents during the same session or in a later evaluation, increasing the pedagogical value of the evaluation. Also, the students can identify and correct their own mistakes without consolidating them, and concentrate in the lecture.

The current research work will be developed in two areas. The first area of research is related to usefulness, described as the way RTES can be used in terms of the equilibrium between the student-professor's effort and the learning improvement performance. In this area, there are several questions about (a) the suitable amount of questions in terms of the duration of a session and the type of contents being studied, (b) the suitable time provided to answer a question and the student perceptions regarding this matter, (c) the writing of the questions and multiple-choice answers, (d) the explanations to the wrong choices of an answer, (e) links to complementary study materials and (f) new question-answer models.

The second research area is about the configuration and usability of RTES regarding aspects such as the type of options needed to design and simplify interaction among the participants and specially, with the synchronous communication in virtual sessions.

**Acknowledgements**. To the opportune and valuable support of M. Milián, J.M. Balcells and R. Rodríguez for the development of this work. Universidad Politécnica de Cataluña, Spain.

## References

[1] K. Marrs and G. Novak, Just-in-Time Teaching in Biology. Cell Biology Education **3,** 49 (2004) .
[2] M. Thelwall, Computer Based Assessment: A versatile educational tool. Journal of Computers and Education, **34,** 40. (2000).
[3] T. Bailey and J. Forbes, Just-in-time teaching for CS0, SIGCSE-05, 366, (2005).
[4] G. Novak, E. Patterson, A. Gavrin and W. Christian. Just-In-Time Teaching: Blending Active Learning with Web Technology. (Prentice Hall Series in Educational Innovation, USA, 1999) [3-5].
[5] S. Simkins, M. Maier, Just-In-Time Teaching Techniques In the Principles of Economics Course, Social Science Computer Review, **22**, 3, (2004).